REMARKS

Claims 39-48 are currently pending in the above-identified application. Claims 1-38, having been previously withdrawn from consideration, have been canceled without prejudice or disclaimer to the subject matter recited therein. The subject matter of claims 1-38 is being prosecuted in another application. Claims 39-48 have been rejected. Applicants respectfully request reconsideration in light of the following remarks.

The Office action indicates that since "applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse". Applicants agree that the election is one without traverse, but for different reasons. In applicants' November 1, 2001 Response, applicants elected "Claims 39-48 for continued examination without traverse" (Emphasis added). Thus, the election is without traverse because the applicants made the election without traverse and not because applicants failed to provide appropriate traverse.

Claims 39-47 stand rejected under 35 U.S.C. §102 as being anticipated by Kawakubo et al. Applicants respectfully traverse the rejection.

Independent claim 39 recites a semiconductor device that includes "a substrate" and "at least one electro-mechanical polished metal layer formed over said substrate". Claims 40-42 are dependent from claim 39. Independent claim 43 recites a semiconductor capacitor that includes "a bottom electrode formed over a substrate", "an insulating layer formed over said bottom electrode", and "a top electrode formed over said insulating layer,

wherein at least one electrode surface comprises an electro-mechanical polished surface". Claims 44-47 depend from claim 43.

Kawakubo et al. discloses a semiconductor memory device that includes a substrate 1 underlying an insulating layer 9. A contact plug 11 is positioned within the insulating layer 9 and a polished bottom electrode 13 is positioned over the contact plug 11. Kawakubo et al. discloses that the bottom electrode 13 is subsequently removed by means of either mechanical polishing or chemical-mechanical polishing (Column 7, lines 60-67; Column 8, lines 1-3 and 45-49; Column 9, lines 9-13 and 40-43; Column 10, lines 47-56; and Column 11, lines 6-9). No other form of polishing is taught or suggested by Kawakubo et al.

Applicants submit that since Kawakubo et al. fails to teach or suggest "at least one electro-mechanical polished metal layer formed over said substrate" as recited in independent claim 39 and "a top electrode formed over said insulating layer, wherein at least one electrode surface comprises an electro-mechanical polished surface" as recited in independent claim 43, Kawakubo et al. cannot anticipate claims 39-47.

Further, the Office action states that "the term 'electro-mechanical polished' merely recites product by process and does not structurally distinguish the metal layer from the structure taught by Kawakubo et al.". Applicants respectfully submit that an electro-mechanical polished surface is different than both mechanical polished and chemical-mechanical polished surfaces. Specifically, electro-mechanical polishing yields a different surface layer at the metallic surface than mechanical and/or chemical-mechanical polishing.

For example, if platinum is used as an electrode, it is difficult to dissolve except in aqua regia solution. A slurry, generally containing hydrogen peroxide, is typically used in chemical mechanical polishing. Platinum acts as a catalyst to decompose the hydrogen peroxide to oxygen gas, thus inhibiting the oxidation of the platinum. Conventionally, chemical mechanical polishing uses a force of at least two to three pounds per square inch (psi), which is sufficiently high with the applied slurry to smear the platinum. On the other hand, if the platinum were oxidized (which it is not for hydrogen peroxide slurry) the resulting platinum oxide may be sufficiently hard to withstand the two to three psi force, thus resisting polishing. For electro-mechanical polishing, the platinum can be electrochemically oxidized. After oxidation, a complexing agent, such as chlorine or NH_3, may be added which lessens the amount of down force required for the polishing, typically to around 0.1 psi. With such a low down force, smearing of platinum is inhibited, and thus electro-mechanically polished platinum is structurally different than a platinum layer polished by other methods such as mechanical polishing (MP) or chemical mechanical polishing (CMP).

Accordingly, there is a clear structural difference between a metal layer polished as in Kawakubo et al. using conventional MP or CMP techniques and a metal layer polished using electro-mechanical techniques in the invention. Since Kawakubo et al. fails to disclose electro-mechanical polishing, it does not anticipate the claimed invention.

Claim 48 stands rejected under 35 U.S.C. §103 as being unpatentable over Kawakubo et al. in view of Sandhu et al. Claim 48 has been amended.

Claim 48 recites a processor system that includes "a processor", and "a memory device electrically coupled to said processor". The memory device has "a substrate" and "a capacitor formed over said substrate, said capacitor comprising at least one electro-mechanically polished layer provided over said substrate".

The arguments provided above regarding the rejection of claims 39-47 are equally applicable here. Specifically, electro-mechanically polished metal layers are structurally distinct from layers polished through other methods and are not taught or suggested by Kawakubo et al. Sandhu et al. is relied upon as disclosing a memory device electrically coupled to a processor and adds nothing of significance to the issue of polished layers.

Accordingly, each of the presently pending claims is believed to be in immediate condition for allowance and the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 1-38 have been canceled.

43. (Amended) A semiconductor capacitor comprising:

a bottom electrode formed over a substrate;

an insulating layer formed over said bottom electrode; and

a top electrode formed over said insulating layer, wherein at least one electrode surface comprises an [mechanical-electro] electro-mechanical polished surface.